

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference MOL0681-PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/IB2005/000788	International filing date (<i>day/month/year</i>) 18 March 2005 (18.03.2005)	Priority date (<i>day/month/year</i>) 18 March 2004 (18.03.2004)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant MOLTECH INVENT S.A.#		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input checked="" type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

	Date of issuance of this report 19 September 2006 (19.09.2006)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Cecile Chatel
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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

REC'D 18 JAN 2006

REC'D 16 JAN 2006

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To:

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see form PCT/ISA/220

60

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IB2005/000788

International filing date (day/month/year)
18.03.2005

Priority date (day/month/year)
18.03.2004

International Patent Classification (IPC) or both national classification and IPC
C25C3/12

Applicant
MOLTECH INVENT S.A.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2005/000788

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2005/000788

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-48
	No: Claims	
Inventive step (IS)	Yes: Claims	1-48
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-48
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43bis.1 and 70.10)

and /or

2. Non-written disclosures (Rules 43bis.1 and 70.9)

see form 210

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V.

Reference is made to the following documents:

D1 : WO 01/31091 A (ALCOA INC; RAY, SIBA, P; LIU, XINGHUA; WEIRAUCH,
DOUGLAS, A., JR) 3 May 2001 (2001-05-03)

1. Document D1, which is considered to represent the most relevant state of the art, discloses :

- A cell for electrowinning aluminium from alumina comprising,
A metal-based anode having an electrochemically active surface that contains predominantly cobalt oxide CoO (p. 4, l. 4-29) ; and
A sodium fluoride/aluminium fluoride-based molten electrolyte containing calcium fluoride in which the active anode surface is immersed (p. 12, l. 16-26).
- A method of electrowinning aluminium in the cell as defined above (claim 31).

From this, the subject-matter of independent **claims 1 and 48** differs in that:

The electrolyte further contains potassium fluoride in an amount between 2wt% and 15wt %.

This leads to a reduction of the operating temperature while electrowinning of aluminium in the cell, and it maintains a high solubility of alumina (about 8 wt%) in the electrolyte, even though the temperature of the electrolyte is reduced.

The subject-matter of claims 1 and 48 is therefore novel (Article 33(2) PCT)

The problem to be solved by the present invention may be regarded as:

Providing an improved electrolyte for electrowinning aluminium, in combination with a metal-based anode having an electrochemically active outer part comprising a layer that

contains predominantly cobalt oxide CoO.

The solution to this problem proposed in claims 1 and 48 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The combination of a metal-based anode with an oxide outer part with a molten electrolyte such as described in claim 1 in a cell for electrowinning aluminium is neither disclosed, nor suggested in the available prior art.

The particular combination of claim 1 shows a synergetic effect, since the composition of the electrolyte (AlF₃, NaF, KF) allows to have a reduction of the temperature necessary to the use of a metal-based anode, together with a limited concentration of aluminium fluoride, leading to a favourable environment for the anode (avoiding both the corrosion of the metallic substrate and the dissolving of the oxide layer), see description p. 6, l. 39-p. 7, l. 37.

2. **Claims 2-47** are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VIII.

Some remarks concerning the clarity of **claim 1** are now made :

It is noted that the term "predominantly" has no specific meaning (clarity Art. 6 PCT) other than that the CoO is the component which is present in the most substantial amount. However, this term is vague and unclear and leaves the reader in doubt as to the exact meaning of the technical feature.

The percentage of alumina, which is dissolved in the electrolyte, is the result of the composition of the molten electrolyte, and therefore, cannot be considered as a feature defining the subject-matter of the claim.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/IB2005/000788